2.2 DEFINITIONS

Revise existing definitions and add new definitions as follows:

Base Flood—The flood or tide having a 1% chance of being exceeded in any given year. Also known as Q_{100}.

~~*Check Flood for Bridge Scour*—Check flood for scour….and remain stable with no reserve. See also superflood.~~

Contraction scour – See "General Scour", below.

Degradation – A general and progressive lowering of the longitudinal profile of the channel bed as a result of long-term erosion.

Design Flood—The flood or tide having a 2% chance of being exceeded in any given year. Also known as Q50.

~~*Design Flood for Bridge Scour*—The flood flow equal to or …as a result of the potential for pressure flow.~~

~~Design Flood for Waterway Opening—The peak discharge…of the design flood for the waterway opening.~~

Flood of Record—The largest recorded flood at the bridge site.

Freeboard—The distance from bridge soffit or bottom-of-girder to the water surface.

General or Contraction Scour—Scour in a channel or on a floodplain that is not localized at a pier or other obstruction to flow. In a channel, general/contraction scour usually affects all or most of the channel width and is typically caused by a contraction of the flow.

Local (Pier) Scour—Scour in a channel or on a floodplain that is localized at a pier, abutment, or other obstruction to flow.

~~*One-Hundred-Year Flood*—The flood due to storm and/or tide having a 1 percent chance of being equaled or exceeded in any given year.~~

River Training Structure—Any configuration constructed in a stream or placed on, adjacent to, or in the vicinity of a streambank to deflect current, induce sediment deposition, induce scour, or in some other way alter the natural flow and sediment regimens of the stream.

Scour—The addition of contraction scour, degradation, and local pier scour. Also referred to as total scour.

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2.5.2.6.3 Optional Criteria for Span-to-Depth Ratios

Revise paragraph one as follows:

Unless otherwise specified herein, if an Owner chooses to invoke controls on span-to-depth ratios, the limits in Table C1, in which S is the slab span length and L is the span lengthk both in ft., may be considered in the absence of other criteria. Where used, the limits in Table C1 shall be taken to apply to overall depth unless noted.

~~Add the following as paragraph 2:~~

~~The Owner, CA Department of Transportation, chooses not to invoke deflection control.~~

Rename Table 1 as Commentary. Content remains unchanged.
Table C 2.5.2.6.3-1 Traditional Minimum Depths for Constant Depth Superstructures.

2.5.5 Bridge Aesthetics

Revise paragraph one as follows:

Bridges should complement their surroundings, be graceful in form, and present an appearance of adequate strength. Hydraulic input with respect to pier shape, location and skew, pier wall vs. column, abutment type, soffit elevation and barrier needs shall still be considered.

2.6 HYDROLOGY AND HYDRAULICS

2.6.1 General

Revise paragraph three as follows:

Evaluation of bridge design alternatives shall consider stream stability, "drift", backwater, flow distribution, stream velocities, scour potential, flood hazards, tidal dynamics where appropriate and consistency with established criteria for the National Flood Insurance Program.

2.6 HYDROLOGY AND HYDRAULICS

2.6.1 General

2.6.2 Site Data

C2.6.1

C2.6.2

Revise as follows:

The assessment of hydraulics necessarily involves many assumptions. Key among these assumptions are the roughness coefficients and projection of long-term flow magnitudes, ~~e.g., the 500-year flood or other superfloods.~~ The runoff from a given storm can be expected to change with the seasons, immediate past weather conditions, and long-term natural and man-made changes in surface conditions. The ability to statistically project long recurrence interval floods is a function of the adequacy of the database of past floods, and such projections often change as a result of new experience.

The above factors make the ~~check flood~~ investigation of scour an important, but highly variable, safety criterion that may be expected to be difficult to reproduce, unless all of the Designer′s original assumptions are used in a post-design scour investigation. Obviously, those original assumptions must be reasonable given the data, conditions, and projections available at the time of the original design.

2.6.3 Hydrologic Analysis

Revise the "bullets" as follows:

- For assessing flood hazards and meeting floodplain management requirements—the 100-year flood;

- For assessing risks to highway users and damage to the bridge and its roadway approaches—the overtopping flood and/or the ~~design~~ base flood for bridge scour;

- ~~For assessing catastrophic flood damage at high risk sites a check flood of a magnitude selected by the Owner, as appropriate for the site conditions and the perceived risk;~~

- For investigating the adequacy of bridge foundations to resist scour—the base flood shall be used ~~check flood for bridge scour;~~

- ~~To satisfy agency design policies and criteria design floods for waterway opening and bridge scour for the various functional classes of highways~~; ~~To satisfy Caltrans' design policies, t~~The floods for waterway openings are the Q50 with adequate freeboard to pass anticipated drift, Q100 without freeboard, or the flood of record without freeboard, whichever is greater.

- To calibrate water surface profiles and to evaluate the performance of existing structures—historical floods, and

- To evaluate environmental conditions—low or base flow information, and in estuarine crossings, the spring and tide range.

2.6.4.3 Bridge Waterway

Revise the 2nd bullet as follows:

- The evaluation of trial combinations of highway profiles, alignments, and bridge lengths ~~for consistency with design objectives.~~ should provide adequate freeboard to pass anticipated drift for the Q50 design flood, to pass the Q100 base flood without freeboard, or the flood of record without freeboard, whichever is greater.

2.6.4.4 Bridge Foundations

2.6.4.4.1 General

DON'T Modify as follows:

The structural, hydraulic, and geotechnical aspects of foundation design shall be coordinated ~~and differences resolved prior to approval~~ during preparation of preliminary contract documents ~~plans~~.

C2.6.4.4.1

DON'T Delete the last "bullet" as follows:

- ~~Where practical, use debris racks or ice booms to stop debris and ice before it reaches the bridge. Where significant ice or debris buildup is unavoidable, its effects should be accounted for in determining scour depths and hydraulic loads.~~

2.6.4.4.2 Bridge Scour

Revise paragraph one as follows:

As required by Article 3.7.5, scour at bridge foundations is investigated for ~~two conditions:~~

- ~~For~~ the base ~~design~~ flood ~~for scour~~, ~~the streambed material in the scour prism above the total scour line shall be assumed to have been removed for design conditions. The design flood storm surge, tide, or mixed population flood shall be the more severe of the 100-year events or from an overtopping flood of lesser recurrence interval.~~

- ~~For the check flood for scour, the stability of bridge foundation shall be investigated for scour conditions resulting from a designated flood storm surge, tide, or mixed population flood not to exceed the 500-year event or from an overtopping flood of lesser recurrence interval. Excess reserve beyond that required for stability under this condition is not necessary. The extreme event limit state shall apply.~~

Revise paragraphs 3 and 4 as follows:

Spread footings for columns or piers on soil or erodible rock shall be located so that the ~~bottom~~ top of footing is below scour depths due to degradation, contraction, and local pier scour during ~~determined for the~~ a ~~check~~ base flood for scour.

Deep foundations with footings shall be designed to place the top of the footing below the estimated degradation plus contraction scour depth where practical to minimize obstruction to flood flows and resulting local scour. The bottom of footing shall be located below the estimated total scour. However, the footing may be located above this level provided the piles and pile connections are designed to withstand this condition. ~~Even lower elevations should be considered for pile-supported footings where the piles could be damaged by erosion and corrosion from exposure to stream currents. Where conditions dictate a need to construct the top of a footing to an elevation above the streambed, attention shall be given to the scour potential of the design.~~

2.6.4.4.2 Bridge Scour (cont.)

C2.6.4.4.2

Revise paragraph four as follows:

Total scour is calculated based upon the cumulative effects of the long-term degradation scour, general (contraction) scour and local scour due to the base ~~design~~ flood. The life expectancy of the bridge should be considered in determining the total degradation or aggradation of the waterway. Long-term scour is based on an assumed 75-yr design life for new construction projects. The recommended procedure for determining the total scour depth at bridge foundations is as follows…
(bullets remain the same as AASHTO).

Add Fig. C2.6.4.4.2-1 following paragraph five as follows:

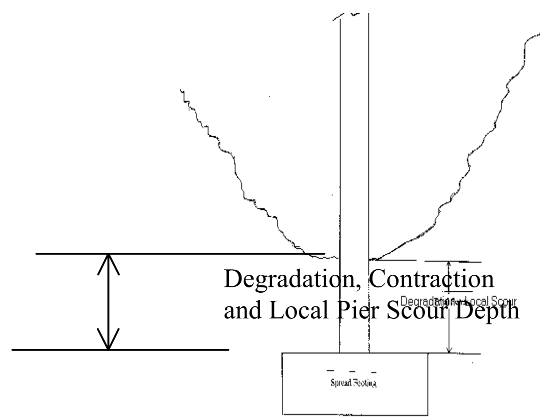

Figure C2.6.4.4.2-1 – Spread Footing Location

Revise the last paragraph as follows:

The stability of abutments in areas of turbulent flow shall be thoroughly investigated. Exposed embankment slopes should be protected with appropriate ~~scour~~ countermeasures. Abutment footings shall be designed so as to be stable for permanent loads and hydraulic forces assuming the loss of approach fill. Deep foundations may be necessary.

C2.6.4.4.2 (cont.)

Revise the 2nd to last paragraph as follows:

Foundations should be designed to withstand the conditions of scour for the base ~~design flood and the check~~ flood. In general, this will result in deep foundations. However, environmental concerns may preclude locating the footing below anticipated scour level. The design of the foundations of existing bridges that are being rehabilitated should consider appropriate countermeasures. ~~underpinning if scour indicates the need. Riprap and other scour countermeasures may be appropriate if underpinning is not cost effective.~~

Add Fig. C2.6.4.4.2-2 after paragraph six as follows:.

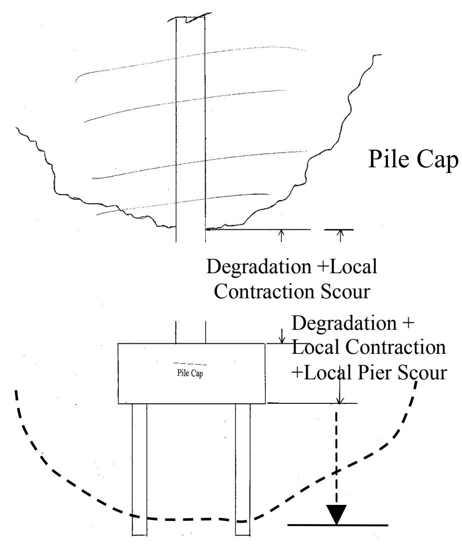

Figure C2.6.4.4.2-2 – Deep Foundation Location

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